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Published in:
Proceedings of the 16th International CINet Conference on Pursuing Innovation Leadership

Publication date:
2015

Document Version
Publisher's PDF, also known as Version of record

STRATEGY, CULTURE AND INNOVATION PERFORMANCE

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ABSTRACT

Firms strive for improving their performance, and organizational culture has been recognized as an important driver of better performance. In parallel, strategy is viewed as an important contextual variable that influences organizational culture as well as performance. This study has two main goals: (1) investigating the relationship between strategic practices and innovation performance, and (2) determining if strategy has a direct and/or an indirect, culture-mediated effect on innovation performance, and if this effect varies across strategic practices and culture profiles. The research model and hypotheses devised are tested using data collected from 250 Brazilian and Danish manufacturing companies. This study contributes to the strategy-organization design-performance debate by showing that strategy has a direct and a mediated effect on performance. Firms supporting their strategy with a suitable cultural profile achieve the strongest performance effects.

Keywords*: Strategic practices, organizational culture, innovation performance*

1. INTRODUCTION

Over the last decades the relationship between organizational culture and innovation has been studied extensively (Büschgens et al., 2013). However the results of these studies show a rather heterogeneous picture of what culture best support innovation. In itself there is little doubt that culture is an important organizational asset, which affects firm performance (Irani et al., 2004; Prajogo and McDermott, 2011; Büschgens et al., 2013). Referring to Cooper and Kleinschmidt (1995) and Zien and Buckler (1997) as examples of, what they call, "studies on the human factors of innovation" (p. 500), Prajogo and Ahmed (2006) note that this research stream assumes that people and organizational context are the main determinants of successful innovation, and support that assumption empirically in their paper.

However, while some studies argue for a culture based on multiple cultural characteristics (Berson et al., 2008; Prajogo and McDermott, 2011), others such as Brentani and Kleinschmidt (2004) support specific cultural characteristics describing what they call an "innovation culture". Thus, Büschgens et al. (2013) conclude that a compelling theoretical explanation for the relationship between organizational culture and innovation is still missing.

There is equally little agreement on the impact of strategy on performance. According to some authors strategy determines organizational design, which in turn influences organizational performance (e.g. Chandler, 1962; Miles and Snow, 1978). Other authors (e.g. Miller, 1986; Porter, 1998), however, suggest a direct relationship between strategy and performance.

Thus, one important question emerging from the literature concerns the relationship between organizational culture and performance (Büschgens et al. 2013). Another, equally important question is: does strategy affect innovation performance directly

(Miller, 1986; Porter, 1998) or does it do so through, i.e. in combination with, a suitable organizational design (Chandler, 1962; Miles and Snow, 1978)? This paper focuses on the interaction between these three constructs, strategy – with a particular interest in operations strategy practices, organization design – with a particular interest in organizational culture, and performance – with a particular interest in innovation performance.

2. THEORETICAL BACKGROUND

Innovation is recognized as a critical driver of sustainable competitive advantage, and central to the growth of output and productivity (Oslo Manual, 2005). According to Oslo Manual (2005), "an innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations" (p. 46). The manual also states that is necessary to better understand critical factor of the innovation process, other than R&D, the interaction among them, and the relevant knowledge flows.

Culture, in particular organizational culture, rather than national culture (e.g. Uzkurt et al., 2013; Valmohammadi and Roshanzamir, 2015), has been recognized as an important driver of better performance (Rad, 2006; Irani et al., 2004; Schein, 1984, Wu et al., 2011). Organizational culture is a set of assumptions and understandings that guide and constrain behavior (Schein, 2004), affects the way an organization operates, influences people's decisions and behaviors and, in effect, its performance (Wu et al., 2011).

Indeed, many companies are now taking their cultural characteristics into account in their managerial decision-making. Accordingly several studies have been developed including organizational culture in an operations management context (Naor et al., 2008, Prajogo and McDermott, 2005; Zu et al., 2010). Several of these studies (e.g. Büschgens et al., 2013; Prajogo and McDermott, 2011) highlight that culture can encourage (or discourage) a variety of behaviors and, through that, innovation performance.

Several authors suggest that the creation of an innovative organizational environment supports innovation activities (Lau and Ngo, 2004; Kanter, 1985, 2000). Additionally, several studies stress organizational culture as one of the keys to innovation (De Brentani et al., 2010; Garnier, 2008; Shipton et al., 2006, Wang et al. 2010). However there is no consensus in the literature. While authors such as Jassawalla and Sashittal (2002) defend one single "innovation-supportive" culture, the findings of Prajogo and McDermott (2011) suggest that having a flexibly-oriented culture, i.e. either the group culture (focused on the internal environment) or the developmental culture (focus on external environment) supports innovation. Accordingly, they highlight the importance of acknowledging the link between an organization's goals and its cultural orientation. Yet, Büschgens et al. (2013) conclude that there are no good or bad cultures for innovation.

Indeed, as Khazanchi et al. (2007) maintain, innovation is a paradoxical issue, requiring flexibility as well as control. Flexibility enables creativity and changes that foster innovation, while control provides the discipline needed to focus innovation initiatives on achieving long-term goals. Additionally, although the studies of the relationship between culture and innovation have mainly focused on a culture of innovation, and found a direct and positive relationship (Lau and Ngo, 2004; Smith et al. 2005), Büschgens et al. (2013) observe that some studies revealed negative correlations (e.g.

Berson et al., 2008; Jaskyte, 2004), which sheds some doubt on the presumed positive culture-innovation relationship.

One of the discussions in organization and strategic management theory concerns the performance effects of strategy. Some authors maintain that strategy determines organizational design – "structure follows strategy", which in turn influences organizational performance (e.g. Chandler, 1962; Miles and Snow, 1979), including innovation performance. Other authors (e.g. Miller, 1986; Porter, 1998), however, suggest a direct relationship between strategy and innovation performance. Using Porter's (1980) strategy typology, the line of reasoning is: successfully pursuing a differentiation strategy *requires* innovation; successfully pursuing a cost leadership strategy requires cost minimization, efficiency through economies of scale rather than scope, and, at best, a focus on process improvement rather than product and other forms of (radical) innovation.

Thus, one important question emerging from the literature concerns the relationship between organizational culture and innovation performance (Büschgens et al., 2013). Another, equally important question is: does strategy affect innovation performance directly (Miller, 1986; Porter, 1998) or does it do so through, i.e. in combination with, a suitable organizational design (Chandler, 1962; Miles and Snow, 1979)? The present study focuses on the interaction between and among *operations* strategy *practices*, *organizational* culture, and *innovation* performance.

3. HYPOTHESES

Two hypotheses were investigated in this study:

H1 *A firm's operations strategy practices affect its innovation performance.*

H2 *The effect of operations strategy practices on innovation performance is mediated by the firm's organizational culture.*

4. RESEARCH DESIGN

4.1 INSTRUMENT AND RESPONDENTS

Data were collected using an electronic questionnaire. A total of 1761 manufacturing companies in Brazil and Denmark (SIC codes 20-39) were mailed. The response rate was 14.2% (250 companies). The unit of analysis is the manufacturing plant and most respondents (80%) occupy production or quality management positions.

4.2 OPERATIONALIZATION AND MEASUREMENT OF CONSTRUCTS

The three constructs were operationalized and measured as follows (see Table 2 for details).

Strategy – There are many ways to operationalize operations strategy. We decided to adopt the "strategy as practices" approach. The strategy-as-practice approach (Johnson et al., 2003; Whittington, 2006) … regards strategy as an ongoing activity and accomplishment – something people and firms do rather than have … – and thus emphasizes the day-to-day activities of people … (Pregnér, 2008). Two groups of strategy were adopted based on managerial practices, namely technical practices, (i.e. the use of techniques that emphasize control and stability), and people practices (i.e. the use of practices that emphasize flexibility and continuous improvement). The use of these strategy groups was measured using eight items on a five-point Likert scale (1 =

"Strongly Disagree", 5 = "Strongly Agree"). These items were derived from the questionnaires of Flynn et al. (1994), Naor et al. (2008) and Zu et al. (2010).
Culture – The Competing Values Framework (Quinn and Rohrbaugh, 1983) was used to identify organizational culture profiles. This framework is based on two main competing dimensions: the flexibility-control, and internal-external focus. These two dimensions combined result in the four cultures: Developmental, Group, Hierarchical, and Rational. The culture profiles were also measured on a five-point Likert scale (1 = "Strongly Disagree", 5 = "Strongly Agree") using twelve items. The survey instruments reported by Cameron and Quinn (2006), Prajogo and McDermott (2011), and Zu *et al*. (2010) were used to operationalize organizational culture. Based on the work of these authors, Table 1 shows the core characteristics of the four cultural profiles.

Characteristics	**Organizational culture profiles**			
	Developmental Culture	**Group Culture**	**Hierarchical Culture**	**Rational Culture**
Orientation	Growth, stimulation, creativity, and adaptation to the external environment	Flexibility and focus on internal organization. Concern with human relations	Internal efficiency, uniformity, coordination, and evaluation	Productivity, performance, goal fulfillment, and achievement
Core values	Creativity, and variety	Belonging, trust, and participation	Security, order, rules, and regulations	Competition, and successful achievement
Leadership	Willing to take risks, and able to develop a vision of future	Participative	Conservative and cautious, paying close attention to technical matters	Directive, and goal oriented
Performance priorities	Growth, development of new market, and resource acquisition	Development of human potential and member commitment	Control, efficiency, and stability	Planning, productivity, and efficiency

Table 1. Organizational culture profiles and their main characteristics (from Gambi et al., 2015; based on Denison and Spreitzer, 1991; Cameron and Quinn, 2006; Prajogo and McDermott, 2005, 2011; Zu *et al*., 2010)

Performance – Items from the Prajogo and McDermott's (2011) survey instrument were used to measure innovation performance on five-point Likert scales. The two items measured were speed of product development (1 = " Very low", 5 = "Superior") and the rate of change in the firm's processes and technology (1 = "Poor", 5 = "Superior").

4.3 RESEARCH MODEL

In attempting to investigate the hypotheses, the research model depicted in Figure 1 was devised. This model shows the interplay among strategy, culture, and innovation performance. With two strategic groups and four organizational culture profiles, eight models were tested.

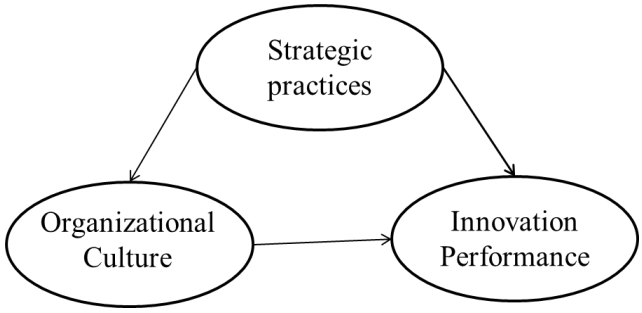


Figure 1. General structural model of the interplay among strategic practices, organizational culture, and innovation performance

4.4 DATA ANALYSIS

First, the survey scales were assessed for reliability using Cronbach's alpha (performed in IBM® SPSS® Statistics 17), the preliminary tests also included descriptive statistics. Second, a confirmatory factor analysis was performed in IBM® SPSS® Amos 20 to assess the measurement model for each construct, the validity of the scales as well as overall fit indexes. Third, Structural Equation Modeling was used to test the relationships of the constructs. The next section provides further details.

5. RESULTS

5.1 PRELIMINARY STATISTICAL TESTS

Scale reliability, communality and explained variance were established as follows.
Strategy – Cronbach's alpha was calculated to evaluate the reliability of the measurement scales. All values were above the threshold of 0.6 (Hair *et al*., 2009), which demonstrates adequate levels of internal consistency. Construct validity was assessed by analyzing the factor loadings of the items based on sample size. All the variables presented values above 0.60 (threshold of 0.35, $p < 0.05$, according to Hair et al., 2009) demonstrating construct validity. Communality (i.e. the extent to which a variable correlates with all other variables) was superior to 0.57 for all items, which shows they are able to explain the factor on which they load. Furthermore, the total variance explained was 61%. Thus, the measurement factors are suitable for explaining the data.
Organizational culture - All variable loadings were above 0.53 (threshold: 0.35; Hair *et al*., 2009). All Cronbach's alphas were larger than 0.73, i.e. well above the 0.6 threshold, which shows that the measurement scales are reliable. Moreover, the communality (> 0.57) of the items and the percentage of total explained variance (71%) indicate that the items and the obtained factors are adequate for explaining the data.
Innovation performance – All variable loadings of the measurements were above 0.80 (threshold: 0.35; Hair *et al*., 2009). Cronbach's alpha was 0.65, i.e. above the 0.60 threshold, which demonstrates an acceptable level of internal consistency of the measures. The items load onto a single factor representing above 73% explained variance, which indicates that the items and the obtained factor adequate represent performance data in testing the research model.
The variables and results of the preliminary statistical tests are presented in Table 2.

Dimensions and variables	Factor loading	Communality	Reliability
Strategic Practices			
Technical Practices			
In my organization, we use methods to identify failures, possible causes, and means to detect these failures in our products/processes.	0.692	0.619	0.748
In my organization, information on productivity is readily available to employees.	0.608	0.427	
In my organization, processes are designed to be mistake-proof to minimize the chances of errors.	0.659	0.568	
In my organization, we use quality indicators (i.e. scrap rates, rework rates, quality cost) to measure quality performance.	0.854	0.743	
People Practices			
In my organization, the employees are encouraged to work as a team, exchange opinions, experiences, and ideas.	0.771	0.636	0.805
In my organization, we work in team with members from a variety of areas to identify customers' needs, and consider them in the product development.	0.717	0.601	
In my organization, the employees often participate in problem solving, and root cause analysis sessions.	0.761	0.677	
In my organization, most employees' suggestions turn into improvement initiatives.	0.741	0.600	
Organizational Culture			
Hierarchical			
In my organization, formalized procedures generally govern what people do.	0.828	0.699	0.728
My organization emphasizes efficiency and control to reach predictable performance results.	0.597	0.607	
The management style in my organization prioritizes conformity, predictability, and stability.	0.747	0.693	
Group			
In my organization, employees can openly discuss their opinions and ideas with someone higher up.	0.840	0.798	0.765
In my organization, employees are encouraged to take decisions.	0.528	0.689	
The management style in my organization is characterized by teamwork, consensus, and participation.	0.526	0.727	
Rational			
My organization is very results oriented, people are very competitive and achievement oriented.	0.811	0.768	0.746
In my organization, objectives and aims are clearly defined.	0.598	0.666	
The management style in my organization is characterized by hard driving competitiveness, high demands and achievement.	0.739	0.727	
Developmental			
My organization emphasizes prospecting for opportunities and creating new challenges.	0.543	0.611	0.781
My organization is a very dynamic entrepreneurial place, which leads people to taking risks.	0.824	0.756	
The management style in my organization is characterized by individual risk-taking, innovation, freedom, and uniqueness.	0.822	0.740	
Innovation Performance			
In my organization, the speed of the product development process against that of our competitors is:	0.814	0.711	0.661
In my organization, the rate of change in our processes and technology against that of our competitors is:	0.803	0.700	

Table 2. Preliminary statistics

5.2 TESTS OF THE STRUCTURAL MODELS

Measures of the overall goodness-of-fit indexes commonly used in the literature (x^2/df, RMSEA, GFI, CFI, and IFI) were used. As a guideline for analysis, RMSEA < 0.05 (good model fit), 0.05 < RMSEA < 0.08 (reasonable model fit) and RMSEA > 0.08 (poor model fit) were adopted. For normed chi-squared (x^2/df), a number smaller than 2.0 is considered very good, between 2.0 and 3.0 is good, and < 5.0 is acceptable (Hair *et al*., 2009). Incremental (CFI and IFI), and absolute; fit indexes (GFI) range from 0.0 (no fit) to 1.0 (perfect fit) (Hair *et al*., 2009; Tabachnik and Fidell, 2007). The overall goodness-of-fit indexes of the models are presented in Table 3.

Indexes	Models							
	I TP-H	II PP-H	III TP-R	IV PP-R	V TP-D	VI PP-D	VII TP-G	VIII PP-G
RMSEA	0.054	0.061	0.070	0.093	0.069	0.079	0.059	0.061
x2/df	1.72	1.93	2.21	3.15	2.19	2.55	1.86	1.94
CFI	0.974	0.968	0.961	0.927	0.956	0.958	0.968	0.973
IFI	0.974	0.968	0.962	0.928	0.957	0.959	0.969	0.973

TP Technically oriented practices
PP People oriented practices
H Hierarchical culture
R Rational culture
D Developmental culture
G Group culture

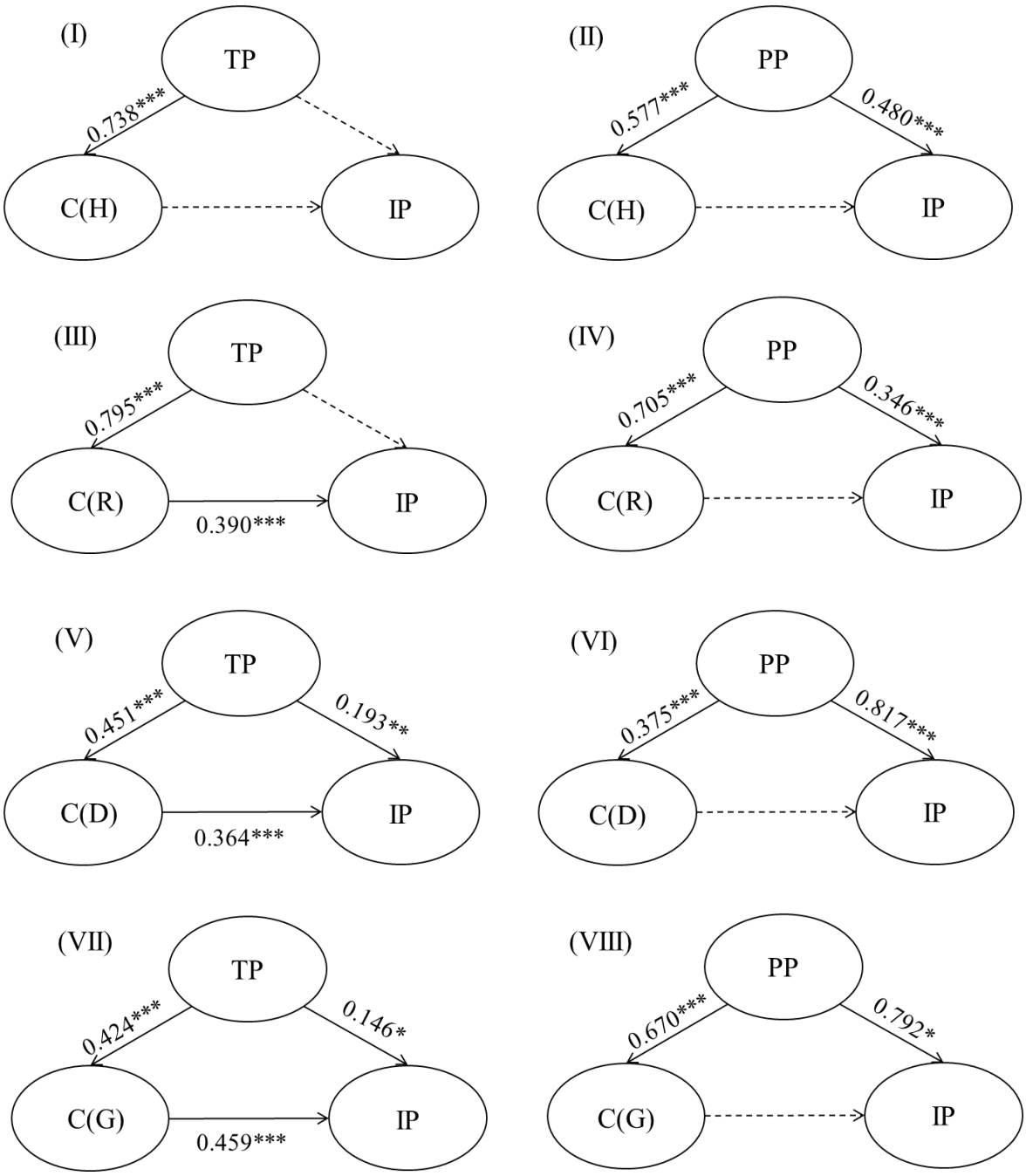
Table 3. The overall goodness-of-fit indexes

Figure 2 displays the eight models and their relationships as well as the performance effects of these relationships. Table 4 summarizes the analytical results.

The overall model statistics show that with the exception of model IV (Figure 2) all models tested have a good fit (x^2/df < 2.55, GFI > 0.95, CFI > 0.96, IFI > 0.96, RMSEA < 0.079). Model IV has good incremental and absolute fit indices, but RMSEA and chi-squared are above the threshold, so the results must be interpreted with caution.

Models I, III, V and VII present the relationships among the technically oriented practices (TP), the four cultural profiles, and innovation performance. Model I shows only a direct effect of technical practices on hierarchical culture. The other relationships and the total performance effect are not significant. In Model III, there is a significant direct effect of TP on the rational culture, and of this culture on performance. The total performance effect is 0.310. In models V and VII, which relate the TP to the developmental and group cultures, respectively, present all the relationships are statistically significant. The total performance effects are 0.357 and 0.341, respectively.

Models II, IV, VI, and VIII present the relationships among the people oriented practices (PP), the cultural profiles, and performance. All these models show only a significant direct effect of PP on culture, and on innovation performance. That is, the indirect effects (through the culture profiles) of PP on performance are insignificant. The highest positive effects of PP on performance were found for the developmental culture, 0.817 and the group culture, 0.792. The effects for the hierarchical and rational cultures are 0.480 and 0.346, respectively.



*** p < 0.01, ** p < 0.05, * p < 0.10, --- (p > 0.10)

TP Technically oriented practices

PP People oriented practices

IP Innovation performance

H Hierarchical culture

R Rational culture

D Developmental culture

G Group culture

Figure 2. The interplay among strategic practices, organizational culture, and innovation performance

	Models							
	I TP-H	**II PP-H**	**III TP-R**	**IV PP-R**	**V TP-D**	**VI PP-D**	**VII TP-G**	**VIII PP-G**
Mediation	No	No	Full	No	Partial	No	Partial	No
Practice→Performance	N.S.	0.480	N.S.	0.346	0.193	0.817	0.146	0.792
Practice→Culture	0.738	0.577	0.795	0.705	0.451	0.375	0.424	0.670
Culture→Performance	N.S.	N.S.	0.390	N.S.	0.364	N.S.	0.459	N.S.
Total effect	N.S.	0.480	0.310	0.346	0.357	0.817	0.341	0.792

TP Technically oriented practices
PP People oriented practices
N.S. Insignificant
H Hierarchical culture
R Rational culture
D Developmental culture
G Group culture

Table 4. The interplay among strategic practices, organizational culture, and innovation performance – summary

6. DISCUSSION

The analysis of the empirical data demonstrates that the relationship among operations strategy, organizational culture and innovation performance is troublesome.

- In one case, model I, neither the technically oriented practices nor the hierarchical culture have an effect on innovation performance.
- In four cases, models II, IV, VI and VIII, the people oriented practices affect culture as well as innovation performance, but culture does not mediate that effect.
- In one case, model III, the rational culture fully mediates the innovation performance effects of the technically oriented practices.
- In two cases, models V and VII, the developmental and group culture, respectively, partially mediate the innovation performance effects of the technically oriented practices.

The technically oriented practices affect innovation performance positively in all models, except for model I, in which there is no effect. Both these practices as well as the hierarchical cultural considered in that model are largely control, efficiency and stability oriented (see Tables 1 and 2) and together they do not provide an environment supporting creativity, entrepreneurship and innovation. In the remaining three models, the performance effects are smaller than for the people oriented practices. Among this group, the effects on performance are highest for the developmental culture (total effect: 0.357) but only slightly so compared with group culture (total effect: 0.341) and the rational culture (total effect: 0.310). The observation that the developmental and group cultures enhance the innovation performance effect of technically oriented practices is not quite surprising considering the core characteristics of these cultural profiles (see Table 1). Considering the nature of the two constructs it is not clear why the rational culture fully mediates the innovation performance effect of the technically oriented practices.

The people oriented practices have a much stronger effect on innovation performance than the technically oriented practices, in all cultural profiles. The strongest performance effect (total effect: 0.817) is found in firms with a developmental culture, which is not quite surprising, considering the nature of the people oriented practices, e.g. (cross-functional) teamwork, listening to the voice of the customer, problem

solving, and improvement. Interestingly, the developmental culture does not mediate the practices-performance relationship. That is, the innovation performance effect of the developmental culture is insignificant, which is quite unexpected considering the orientation of that culture toward flexibility and adaptation to the external environment, innovation and creativity, entrepreneurship and leadership that is willing to take risks (see Table 1). The second strongest performance effect of people oriented practices is found in firms with a group culture (total effect: 0.792). Here again, though, the performance effect is entirely due to the practices; the cultural effect is insignificant, which is surprising considering that the core characteristics of this culture, teamwork, participation and belonging, concern with human relations, empowerment and member commitment (see Table 1), should provide a fruitful organizational environment for continuous improvement, creativity and innovation. In firms with a hierarchical or a rational culture, the performance effects of the people oriented practice are smaller (total effects: 0.480 and 0.346, respectively). Again, culture does not affect innovation performance which, in these cases is perhaps less surprising considering that control and efficiency are among the core characteristic of these cultures (see Table 1).

7. CONCLUSION

7.1 CONTRIBUTION TO THEORY

In summary, the findings suggest that:

- Firms with a hierarchical culture using technically oriented practices should not expect to perform innovatively. This finding is consistent with the nature of this cultural profile and these operations strategy practices.
- Firms implementing their operations strategy in the form of technically oriented practices need a rational culture to achieve innovation performance. This finding needs further research.
- Firms using technically oriented practices need a developmental or group culture to enhance the limited innovation performance effect of their practices. These findings are consistent with the nature of these cultural profiles and operations strategy practices.
- Irrespective of a firm's cultural profile, people-oriented practices affect performance positively; culture does not enhance that effect. This is a puzzling finding, which requires further research.

Finally and going back to the discussion on "strategy affects performance through organizational design" versus "strategy affect performance directly", the jury is still out. In most cases, strategy affects innovation performance directly and not through culture, cf. Miller (1986) and Porter (1998). In other cases, culture mediates the strategy-performance relationship, cf. Chandler (1962) and Miles and Snow (1978).

7.2 CONTRIBUTION TO PRACTICE

Practically, our findings indicate that the managers pursuing their operations strategy through technically oriented practices can achieve a certain, albeit limited level of innovation performance, which is partially or fully mediated by the culture of their organization. The exception are firms with a hierarchical culture, in which neither practices nor culture produce any innovation performance effect. Firms pursuing innovation should use people oriented practices and, although culture does not enhance the innovation performance effects of these practices, preferably, a developmental or group culture.

7.3 LIMITATIONS AND FURTHER RESEARCH

This work contributes to the strategy-organization design-performance debate by showing that *operations* strategy may have no, a direct and a mediated effect on *innovation* performance. The finding that a rational culture fully mediates the relationship between technical practices and innovation performance needs further research. The other findings related to these practices are hardly surprising. The puzzling observation that culture does not partially mediate the relationship between the people oriented practices and innovation performance needs further research. Furthermore, there are certain limitations to this study, which lead to a couple of suggestions for further research. Innovation performance was measured using two items measured qualitatively, which gives a limited picture of innovation. Furthermore, the study was restricted to firms in Brazil and Denmark. Future research should go beyond these countries. Finally, future research should consider the possible influence of factors such as competitive context, industry type, firm size and dominant technology.

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